

Amendments to the Drawings:

The attached sheets of drawings include changes to Figures 1 and 4. These sheets, which include Figs. 1 and 4, replace the original sheets including Figs. 1 and 4.

Attachment: Replacement Sheets

REMARKS

This is a Response to the Office Action mailed March 5, 2009, in which a three (3) month Shortened Statutory Period for Response has been set, due to expire June 5, 2009. In this Amendment, claims 43, 49, 50, 53 and 58 have been amended to correct minor errors. No new matter has been added by way of this Amendment.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090. Claims 31-47 and 49-61 are pending.

Objections

The drawings were objected to because Figures 1 and 4 were not clear. Figures 1 and 4 have been amended to improve clarity and 2 sheets of drawings are presented herewith for approval. No new matter has been added.

Rejections Under 35 U.S.C. § 103

Claims 33-47 and 49-61 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Parker et al. (U.S. Patent No. 7,024,280, hereinafter "Parker").

The present rejection does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a). "Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1734, 82 U.S.P.Q.2d 1385, 1391 (2007). This obviousness determination is made based on underlying factual inquiries, including:

1. the scope and content of the prior art;
2. the differences between the prior art and the claims at issue;
3. the level of ordinary skill in the pertinent art; and
4. secondary considerations.

Graham v. John Deere Co., 383 U.S. 1, 17-18, 148 U.S.P.Q. 459, 467 (1966). The Examiner should also support an obviousness determination by identifying some reason or motivation that would have prompted a person of ordinary skill in the relevant field at the time of the invention to combine the prior art elements in the way claimed by the application at issue. *KSR*, 127 S.Ct. at 1740-41, 82 U.S.P.Q.2d at 1396. Moreover, a prior art reference must be considered in its entirety, *i.e.*, as a whole, including portions that would lead away from the claimed invention. M.P.E.P. § 2141.02(VI); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

Independent Claims 50, 53 and 58

A *prima facie* case of obviousness for claims 50, 53 and 58 has not been established because of substantial differences between the teachings of the cited reference and the limitations recited in these independent claims.

Parker is generally directed to a robot (100) that can be manipulated remotely by a user or operate autonomously. “Robot 100 has several modes by which the robot 100 can operate. Several modes allow the robot 100 to operate autonomously, while other modes require a user to remotely manipulate the robot 100.” (Column 6, lines 32-35.) The robot taught by Parker employs passive infrared sensors (114), active infrared emitters (115), and a video device (122).

Importantly, the video device 122 is used to provide video images to a remote control device (500) that enables a user to manipulate the robot. In particular, the remote control device (500) includes a joystick (502), a video display (504), and various control buttons. Parker’s robot (100) does not use video images in autonomous mode. Parker merely discloses that video images are provided to the remote control device (500) so that the user can manipulate the robot (100).

It is also important to realize that while the passive infrared sensors (114) and the active infrared emitters (115) “help the robot 100 avoid bumping into obstacles” (column 4, line 56), the passive infrared sensors (114) and the active infrared emitters (115) do not capture an image.

The robot has three vertically aligned active infrared emitters per leg (106), which are arranged in a pattern that “allows for each emitter 115 to detect an object at a different distance or time.” (Column 5, lines 15-17.) In particular, “since the top emitter emits a signal substantially parallel to the ground, the top emitter will indicate that an object is in front of the robot 100, but at a distance far away. As the middle emitter emits a signal toward the floor, the middle emitter will indicate that an obstacle is in front of the robot 100 and closer than if the top emitter would have detected the object. Similarly, as the bottom emitter substantially emits a signal toward the ground, the top or middle emitter may not detect an object very close. Thus, the bottom emitter, by not receiving a signal, will indicate that an object is directly in front of the robot 100 and that the obstacle is very near, such as an edge.” (Column 5, lines 17-28.)

Parker discloses that “[t]he [passive infrared] sensor 114 is a separate system from the active infrared emitters 115. The PIR sensor 114 does not emit a signal. Instead, the PIR sensor 114 detects heat.” (Column 5, lines 41-43.)

At column 6, lines 37-49, Parker further discloses:

When the automatic mode is selected, the robot 100 begins to move autonomously throughout the room. As explained above, the active infrared emitters 115 assist the robot 100 to avoid bumping into obstacles and traveling off an edge. While the robot 100 is moving throughout the room it will occasionally speak from the auto vocabulary, depending on sensor input. Simultaneously, the PIR sensor 114 scans the area in front of the robot 100 to detect a heat source. When the robot 100 detects a heat source, the rotatable platform 124 will turn toward the object and speak from its "roam" vocabulary (e.g., "Nice to see you again.", "How are you.", etc.)

(Emphasis added.)

In contrast to Parker, Applicants' claims are directed to methods and apparatus that employ *single camera* three-dimensional (3-D) vision for robotic guidance.

For example, claim 50 is directed to “[a] method useful in three-dimensional pose estimation for use with a single camera mounted to a movable portion of a robot.” (Emphasis added.) Claim 50 recites “capturing a two-dimensional image of a volume containing a target object; locating a number of features in the captured image of the target object; and determining an object space-to-camera space transformation for the target object based at least in part on a position of at least some of the located features using only the single captured image and an

algorithm that employs a known or determinable physical relationship between at least some of the located features.”

As described above, Parker fails to disclose, teach, or suggest at least the aforementioned limitations. Therefore, Applicants respectfully request that the rejection of claim 50 be withdrawn.

Also for example, claim 53 is directed to an apparatus useful in robotics, and recites, *inter alia*, “a *single camera* operable to capture at a number of images of a calibration object; means for calibrating the camera.” (Emphasis added.) Similarly, claim 58 is directed to an apparatus useful in robotics, and recites, *inter alia*, “a *single camera* operable to capture a number of images of a calibration object; means for calibrating the camera.” (Emphasis added.)

Parker discloses that “the arms 104 are calibrated by moving them through a range of motion that the robot 100 can track their position from the starting position” when the robot is turned on (column 3, lines 44-47), but Parker fails to discuss calibration of the video device 122 (or any other part of the robot). Thus, Parker fails to disclose, teach, or suggest at least “means for calibrating the camera,” and therefore, Applicants respectfully request that the rejection of claims 53 and 58 be withdrawn.

Further, the dependent claims recite many limitations which are not taught or suggested by Parker. For example, a number of the dependent claims recite specific acts and structures to determine transformations. Such acts or structures do not appear to be disclosed or suggested by Parker.

As one example, claim 43 recites, *inter alia*, “capturing an image of a teaching object of a type of object that will be manipulated by the robot,” and claim 54 recites a similar, but not identical limitation. While Parker’s robot is capable of gripping objects, there is no indication that the robot can grip objects in autonomous mode. At column 10, lines 1-19, Parker discloses the following:

To grip an object, the second finger element 108 can move to a width opening of approximately 75 millimeters away from the first finger element 110. The second finger element 108 can be opened and closed via the hand control button 544 on the remote control 500. Similar to the direction buttons, by quickly depressing the hand control button 544, the second finger element 108 will move to the next preset position. As the motor 150 that controls the movement of the second finger

element 108 only rotates in one direction, the second finger element 108 simply cycles through an open and close position. By holding down the hand control button 544 is also divided into a left and right portion. The left half of the hand control button 544 controls the left hand and the right half of the hand control button 544 controls the right hand grip. Thus, the hand grips can be controlled independently. Thus, holding down the hand control button 544 cycles the second finger element 108 through the entire range of motion. The second finger element 108 is also clutched in both directions.

(Column 10, lines 1-19).

In other words, Parker's robot relies on user control/manipulation of the robot to grip an object. In contrast, Applicants' capture an image of an object so that the robot may manipulate the object. Parker fails to disclose, teach, or suggest at least the aforementioned limitation, and therefore Applicants respectfully request that the rejection of claims 43 and 54 be withdrawn.

Failure to State a *Prima Facie* Case of Obviousness

At page 3, the Office Action concludes that "Parker et al. teaches implicitly an algorithm that employs a known or determinable relationship between at least some of the located features," where the features are located in a two-dimensional image of a target object.

It is well established that "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). See also *KSR*, 127 S.Ct. 1727, at 1740-41, citing *In re Kahn* with approval. The Office Action has failed to articulate reasoning with some rational underpinning to support the conclusion that Parker teaches an algorithm that locates features in a two-dimensional image. As previously stated above, Parker's video images are provided to a user. There is no disclosure of the robot doing anything with an image. Therefore, Applicants respectfully submit that the Examiner has failed to meet his burden for establishing a *prima facie* case of obviousness, and Applicants request that the rejection of the pending claims be withdrawn.

Further, Applicants respectfully note that the rejection cannot be sustained based on an alleged "implicit" teaching. The Examiner has the burden of showing that the reference or references, expressly or inherently, disclose all of the claim limitations. Inherency may not be

established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. See MPEP 2112.

Stated Rejections Are Not In Compliance With M.P.E.P. § 707

In the Office Action, each rejected claim must be specified and “[a] plurality of claims should **never** be grouped together in a common rejection, unless that rejection is equally applicable to all claims in the group.” (See, M.P.E.P. 707.07(d)) (emphasis added). The Examiner has provided a single rejection that groups all of the pending claims together. Applicants submit that the claims cannot be grouped together because of the limitations of the individual claims are different. Therefore, in the event that the rejections are not withdrawn, Applicants respectfully submit any claims that might be rejected in a subsequent Office Action cannot be grouped into one rejection and respectfully request that the Examiner individually explain the rationale of any rejected claim. Unless the Examiner provides a fact-based, reasoned analysis for all of the rejected claims, the Examiner is “leaving the applicant to shoot arrows into the dark hoping to somehow hit a secret objection harbored by the examiner, which is not permissible. *In re Oetiker*, supra.

Furthermore, in the event that the rejections are not withdrawn, Applicants respectfully request that any subsequent Office Action be Non-Final. Applicants submit that the deficiencies of the current Office Action have denied Applicants of a fair opportunity to meet the objections with evidence and argument.

Conclusion

Overall, the cited reference does not teach or suggest the claimed features of the embodiments recited in the independent claims, and thus such claims are allowable. Because the remaining claims depend from the allowable independent claims, and also because they include additional limitations, such claims are likewise allowable. If the undersigned attorney has overlooked a relevant teaching in any of the references, the Examiner is requested to point out specifically where such teaching may be found.

In light of the above amendments remarks, Applicants respectfully submit that all pending claims are allowable. Applicants, therefore, respectfully request that the Examiner reconsider this application and timely allow all pending claims. Examiner Marc is encouraged to contact Mr. Ringer by telephone to discuss the above and any other distinctions between the claims and the applied reference, if desired. If the Examiner notes any informalities in the claims, the Examiner is encouraged to contact Mr. Ringer by telephone to expediently correct such informalities.

Respectfully submitted,
SEED Intellectual Property Law Group PLLC

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EMR:sc

Enclosures:
2 Sheet(s) of Drawings (Figures. 1 and 4)

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